

# Pollution - A Rising Environmental Problem

**Pollution** is the introduction of harmful materials into the environment. These harmful materials are called **pollutants**.

## WHAT IS WASTE?

**Waste** is any unwanted or undesired material or substance resulting from industrial, commercial mining, and agricultural operations, and from community activities. With the increasing population size, waste generated is becoming unmanageable. Open dumps and heaps of garbage is a common site.

The waste generated from various sources can be classified into two categories, biodegradable waste and non-biodegradable waste.

**(a) Biodegradable waste:** Biodegradable wastes are those substances which can be broken down by microorganisms into harmless and non-toxic substances. Ex Vegetable peel, food waste

**(b) Non-biodegradable waste:** Non-biodegradable wastes are those substances that cannot be broken down by microorganisms. These include plastics, metallic cans, glass, electronic waste (E-waste), etc.

## Types of POLLUTION

There are five major types of pollution :

1. Air pollution
2. Water pollution
3. Soil pollution
4. Radiation pollution
5. Noise pollution

## AIR POLLUTION

**Air pollution means degradation of the air quality which harmfully affects the living organisms as well as certain objects.**

### **Types of air pollution:**

**Air pollution is basically of two types:**

**1. Gaseous pollution:** Harmful gases given out from a variety of sources.

**2. Particulate pollution:** Particles such as those of dust, smoke, mining, stone drilling, wearing of rubber tyres of motor vehicles.

### **Sources of air pollution:**

**1. Natural sources :-** These pollutants are beyond human control and will continue to occur.

**2. Man-made sources**

**Examples:** Vehicular (automobiles), industries, garbage, brick kilns. These are the four major sources which are under human control and the methods for controlling them are being developed.

### **1. Vehicular Air Pollution**

There are various kinds of vehicles running on petrol and diesel. The exhaust given out contain three main gaseous pollutants:  $\text{CO}_2$ ,  $\text{SO}_2$ , and  $\text{CO}$ .

Wearing of rubber tyres of the automobiles releasing rubber particles and the road dust particles into the air.

**Control :** Efficient engines, good quality automobile fuels, lead-free petrol, greater use of compressed natural gas (CNG).

### **2. Industrial Air Pollution**

Industries give out all kinds of pollutants.

The chief industrial gaseous pollutants again consist of  $\text{CO}_2$ ,  $\text{SO}_2$ , and CO and also oxides of nitrogen.

The smoke released by the factory chimneys into the air contains lot of particulate pollutants.

### SMOG (Smoke plus Fog)

The smoke released from various sources may get mixed with dust particles and small drops of fog to produce what is called **smog**. Smog is harmful to plants and, if inhaled, may cause asthma and allergies in humans.

### 3. Burning Garbage

On burning, the garbage releases  $\text{CO}_2$  and some other harmful gases too.

### 4. Brick Kilns

The brick kilns are fire-heated enclosures for making construction bricks. The wastes produced are large quantities of ash and broken brick bits.

## WATER POLLUTION

**Water pollution** means any change in the water quality which makes it unsuitable for use by humans and by other living organisms.

### Sources of water pollution:

The five major sources of water pollution are as follows:

1. Household detergents
2. Sewage
3. Industrial wastes
4. Oil spills
5. Thermal pollution

## 1. Household Detergents

Every home uses some detergents (cleansing agents) to wash and clean the soiled or worn garments, crockery, utensils, etc. The dirty water flows down the drains.

## 2. Sewage

Sewage is the liquid waste from domestic activities. It consists of kitchen wastes, toilet and other household waste water. Most cities have sewage treatment plants to remove the dirty part and release the cleaned fluid water into nearby water bodies or rivers.

## 3. Industrial Waste

A large number of industries (small scale as well as large scale) produce waste water which contains various types of chemical pollutants. Such liquid waste material produced by factories is called effluent, and it is commonly discharged into the rivers.

## 4. Oil Spills

**Oil spills** are the accidental discharges of petroleum in oceans or estuaries. The sources of spills are the overturned oil tankers, offshore oil mining, oil refineries. Oil pollution kills a lot of marine life.

## 5. Thermal Pollution

Many industries (thermal power plants, oil refineries and even nuclear power plants) use water for cooling their machinery. This hot waste water may be 8-10°C warmer than the intake water, and is released into the nearby streams, rivers or the sea and causes warming.

## SOIL POLLUTION

The soil pollution is largely localised whereas the air and water pollutions can spread to long distances. The major sources of soil pollution are:

1. Industrial wastes
2. Urban commercial and domestic waste
3. Chemical fertilizers
4. Biomedical waste
5. Pesticides

### 1. Industrial waste

In addition to releasing gaseous air pollutants and chemical-laden water, industries also give out much solid wastes. These wastes are in the form of chemical residues, flyash, metallic ash, etc.

### 2. Urban Commercial and Domestic Wastes

The cities and towns have a variety of markets food grains, vegetables and fruits. They have tailors, restaurants, banquet halls giving out lot of solid waste in different forms. At home, we produce wastes in the form of plastic bags, glass bottles, electric bulbs, kitchen waste, paper-packaging, etc

### 3. Chemical Fertilizers

Chemical fertilizers help in faster and increased crop yield. But their excessive use is harmful. These fertilisers are slowly washed away by the rain water, to reach lakes and ponds. This leads to faster growth of bacteria which consume lot of oxygen in water resulting in the death of fish and other water animals.

### 4. Biomedical Waste

There are numerous items under this category:

- needles, syringes, dirty dressings, etc.
- unused discarded medicinal tablets and powders.

- discarded biological research materials carelessly disposed off in the municipal garbage.

## 5. Pesticides

Several pesticides such as DDT were much used to kill pests in agricultural farms, godowns and even at homes. Most of these persisted in the environment as pollutants causing much harm to life indirectly.

## RADIATION

**Radiation** is a form of energy consisting of high energy particles. It is being used extensively in the fields of medicine (X-rays, etc.) and in generating electricity in the nuclear power plants.

## NOISE POLLUTION

Noise is defined as any unpleasant/loud undesired sound interfering with one's hearing and concentration and the pollution caused due to noise is termed as noise pollution.

### *Harmful effects of noise pollution:*

1. Interferes in communication.
2. Interrupts concentration of thought and disturbs peace of mind.
3. Lowers efficiency of work.
4. Disturbs sleep and leads to nervous irritability.
5. A sudden loud sound can damage ear drum. Prolonged noise can even lead to deafness.
6. Bird life gets disturbed by aircrafts landing or taking off from airports.

### *Measures to minimise noise pollution:*

- Prohibiting blowing of horns.

- Restriction on loud speakers, specially during night.
- Planting trees by the road side and keeping doors closed in the houses reduce noise reaching our ears.
- Not to burn fire crackers.

## EFFECTS OF VARIOUS TYPES OF POLLUTION

### A. Effects on climate and environment

The three most significant ones are: (i) Acid rain, (ii) Greenhouse effect and global warming and (iii) Ozone layer depletion

#### 1. Acid rain

Due to increasing industrialisation there is lot of emission of  $\text{CO}_2$  and sulphur dioxide ( $\text{SO}_2$ ) and oxides of nitrogen which get dissolved in the rain drops falling on earth as rain.

Harmful effects of acid rain :

- Damage to vegetation by pollution of the soil.
- Decay of building material and paints.
- Erosion of ancient monuments, statues and sculpture by the acid reacting with the calcium.
- The fine particles (sulphates, nitrates) degrade visibility and harm the human health.

#### 2. Greenhouse effect and global warming

**Greenhouses** are small glass houses specially constructed to grow plants particularly during cold winters. The glass panel all around lets the sunlight enter but does not allow the heat to escape.

- Certain gases specially  $\text{CO}$ , and methane ( $\text{CH}_4$ ) accumulating in the atmosphere prevent the escape of heat, thus warming the air.



- With increased industrialisation, burning of fuels in homes, and rising population more  $\text{CO}_2$  is released. On the other hand, the decreasing vegetation and deforestation is leading to less  $\text{CO}_2$  utilisation in photosynthesis.

### 3. Ozone layer depletion

Ozone ( $\text{O}_3$ ) is an allotropic form of oxygen ( $\text{O}_2$ ). It forms a sort of sunscreen high up in the atmosphere. It prevents the harmful type of ultra violet rays (UV-B) coming down from the sun. Certain gaseous compounds such as CFCs (chlorofluorocarbons) released from refrigerators, aerosol-sprayers and packing material styrofoam, rise into the atmosphere.

**INTERNATIONAL OZONE DAY** – September 16

### B. Effects on human health

- Air pollution causes respiratory problems, lung disorders. Particulate lead may cause blood cell shortage. Smog leads to asthma and poor visibility. The exhaust gas  $\text{SO}_2$  causes serious damage to the air passages in lungs.
- Water pollution may lead to several diseases like cholera, jaundice and typhoid.
- Soil pollution may indirectly affect human health. The pesticides used in agricultural farming may cause health problems.

### CONTROL OF POLLUTION

- Pollution cannot be totally controlled but several steps can be taken to curtail it. Use of unleaded petrol and of CNG (Compressed Natural Gas) in automobiles.
- Switching of the automobile engines at red lights and when not in use.



- Installation of tall chimneys in factories, and fitting them with filters and, electrostatic precipitators.
- Not to throw food wastes into open ground or in the drains.
- Greater use of compost (organic matter) instead of chemical fertilisers, and judicious use of pesticides.
- Recycling of plastic, metal and glass material and incineration (burning) of non-recyclable waste.

## VEHICULAR STANDARDS

### *Euro Bharat vehicular standards :*

Certain norms have been laid down under the title Euro/Bharat norms that are applicable to automobiles. These aim to effectively cut down Sulphur and Nitrogen oxides from automobile exhausts.

**BS (Bharat Stage) emission norms** were first set up to control pollution in the year 2000 and have been upgraded since to BS II, BS III and now BS IV norms.

## SWACHH BHARAT ABHIYAN (CLEAN INDIA MOVEMENT)

The Swachh Bharat Abhiyan is a significant cleanliness campaign started by the Government of India. It was officially launched on 2nd October 2014 with a dream of a clean and hygienic India. It emphasized upon people to neither litter, nor let others litter.

Following are some objectives of the campaign:

- to clean the streets, roads and infrastructure of the country's cities and towns.
- to establish an accountable mechanism of monitoring latrine use.
- to achieve efficient solid and liquid waste management systems.

## PLASTIC POLLUTION

**Single use or disposable plastics** are items that are intended to be used only once before they are discarded, such as polythene bags,

**Ways to lessen the plastic menace :**

- Observe the three Rs - Reduce, Reuse, Recycle.
- Carry your own refillable water bottle.
- Avoid using disposable cutlery and straws.

Carry your own reusable fabric bag and do not ask for carry bags made of plastic.

- Try to give plastic containers and other such items to your nearby scrap dealer for recycling.